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**TECHNICAL MEMORANDUM**

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**To:** Ray Cody and Karen Simpson, United States Environmental Protection Agency, Region 1  
**From:** Matt Lundsted and Nick Cristofori, CEI and Ken Hickey and Bruce Jacobs, WaterVision  
**Subject:** **Task 1 Cost Memo: A description of anticipated conceptual construction costs associated with Cape Cod BMP conceptual designs.**  
**Date:** February 17, 2015

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This memo provides a summary of the anticipated construction costs associated with the conceptual design phase completed as part of the United States Environmental Protection Agency (EPA) project entitled; *Design and Construction of a Green Infrastructure Stormwater BMP Retrofit for One or More Municipal Properties on Cape Cod: A Demonstration and Education and Outreach Project*. Estimated construction costs for each of the two proposed stormwater BMPs are provided below along with discussion of potential cost savings opportunities. This cost memo has been revised to include a set of optional items, as requested by EPA.

***Oyster Pond BMP, Chatham Massachusetts***

Based on the attached Engineer's Estimate and discussions with the anticipated construction contractor for this project, it is estimated that the Oyster Pond stormwater BMP will cost approximately \$216,000 to construct. It is also recommended that an additional 15% of the above construction estimate be carried to account for potential project overruns and other unforeseen issues. Therefore, an additional \$32,000 should be retained, bringing the total construction estimate to approximately \$248,000 for the site. See Engineer's Estimate included as **Attachment A** for additional information.

***Gateway Marina BMP, Barnstable, Massachusetts***

Based on the attached Engineer's Estimate and discussions with the anticipated construction contractor for this project, it is estimated that the Gateway Marina stormwater BMP will cost approximately \$66,000 to construct. It is also recommended that an additional 15% of the above construction estimate be carried to account for potential project overruns and other unforeseen issues. Therefore, an additional \$10,000 should be retained, bringing the total construction estimate to approximately \$76,000 for the site. See Engineer's Estimate included as **Attachment B** for additional information.

***Cost Summary***

Based on the anticipated construction items in the enclosed attachments, it is estimated that construction of both stormwater BMPs would cost approximately \$282,000. As outlined above, it is recommended that a 15% contingency of \$42,000 be carried to account for unanticipated items during the construction process. Therefore, a total amount of \$324,000 should be assumed for budgetary planning purposes, should both BMPs be constructed.

## ***Optional Items***

Oyster Pond BMP Drainage Tie-In – If additional funding became available, it appears feasible to tie back into the existing drainage system (rather than discharge to drainage conveyance channel). This option would either include installation of an additional new manhole in Oyster Pond Furlong and trenching an additionally 75 linear feet of pipe, or tying into an existing manhole and trenching an additional 140 linear feet of pipe. Costs for either option would be approximately the same and are estimated at approximately \$30,000.

Gateway Marina BMP Tide Gate – If desired, a tide gate or backflow preventer could be installed on the existing stormwater bypass pipe to reduce potential flooding impacts during some storm events. Additional funding is required to purchase and install this device unless the Town of Barnstable would like to perform this task as an in-kind service. Pricing varies considerably depending on the type of backflow preventer, however will likely be in the order of several thousand dollars to purchase and install. However, as the stormwater BMP is located within the 100-year floodplain, large storm events will inundate the entire area, thereby rendering a tide gate ineffective. Therefore, it is not recommended that a tide gate or backflow preventer be installed at this time. If tidal backwatering is observed to be adversely affecting the area during construction or monitoring program (if applicable), then this option should be reevaluated.

Oil Skimmer System – If desired, an oil skimmer system could be installed as supplementary pretreatment at each site. Timely operation and maintenance of this item would be critical to ongoing performance, and thus towns would have to be willing to diligently perform the maintenance associated with an oil skimmer system. Additional funding would be required to purchase and install this device, unless Towns performed this task as an in-kind service. Pricing varies considerably depending on the complexity, size and type of the system. Based on the surrounding land use at each site, oil skimmer systems are likely not necessary at either location. Instead, it is recommended that an oil/water separator hood be installed on the proposed inlet structure at the Barnstable site as part of the design. The oil/water separator hood would be installed within the existing budget for the Barnstable BMP.

Stabilized Access area at Gateway Marina BMP – Most of the proposed design will make use of the nearby brick walking path to access the site. If desired, a stabilized grass area could be created (e.g. from plastic grids or mats), however additional funding would be required to implement this item at an estimated cost of approximately \$3,000 to \$5,000. The Town of Barnstable could potentially implement this option on its own at the conclusion of construction, if feasible. Alternatively, construction is anticipated to use plywood sheets that can be used to temporarily cover grass areas as needed to minimize disturbance. The same method can be used during maintenance operations at low cost.

## ***Potential Cost Savings Opportunities***

During correspondence with the construction contractor, several items were identified as potential cost savings opportunities. Although there are a number of minor items, the following two major items were identified during conceptual design as potentially most beneficial for cost savings:



- Staging Areas – Material staging areas are limited at both sites, particularly the Chatham location. Therefore, materials that are brought in will need to be used almost immediately, resulting in logistical challenges. Should a nearby staging location be available, a construction cost savings would likely be realized. The Barnstable location appears to have an adjacent parking lot that could potentially provide an ideal staging area.
- Material Disposal – Construction at both sites will result in a net cut, particularly at the Chatham location where it is estimated that as much as 1,700 cubic yards of material will need to be removed and disposed. Should a nearby dumping location be available, or if municipalities are willing to provide assistance with this item, a construction cost savings would likely be realized.

Both Chatham and Barnstable may be able to assist with the above items in order to reduce costs. Both of these items are noted in Section 4 of the Summary Memorandum documenting potential in-kind services as “assist with materials management, including stockpile and reuse of excavated materials”. Anticipated cost savings will be available as the design is progressed towards a final product.

### **List of Attachments**

The following supporting information is included as attachments to this Summary Memorandum:

- Attachment A – Engineer’s Conceptual Cost Estimate, Chatham
- Attachment B – Engineer’s Conceptual Cost Estimate, Barnstable



**ATTACHMENT A - ENGINEER'S CONCEPTUAL COST ESTIMATE, CHATHAM**

TOWN : Chatham

PROJECT: Surface Gravel Wetland

ITEM #	Item Description / Notes		UNIT	TOTAL
<b>Item 1 - Mobilization, Clearing and Erosion Controls</b>				
1A	Mobilization, Demobilization and Travel			
1B	Clearing and Grubbing - Approximately 1/3 Acres			
1C	Erosion Controls - Place on Downhill Slope and Up Sides			
<b>Item 2 - Excavation and Gravel Wetland Construction</b>				
2A	Strip Topsoil for Reuse - Assume 6" Deep, 65% Usable			
2B	Site Excavation - Regrade Site and Dig Gravel Wetland			
2C	Excavation Dewatering			
2D	Geotextile Fabric for Separation			
2E	Crushed Stone - 30" Layer in Gravel Wetland			
2F	Crushed Stone Maintenance Road - Create 6" Thick Road			
2G	Wetland Soils - Place 8" Layer on Top of Gravel Wetland			
<b>Item 3 - Drainage Structures</b>				
3A	Outlet Control Structure - RCP, 4' Diameter			
3B	Manhole - RCP, 4' Diameter			
3C	Frame and Cover - Assume 1 per Above			
3D	Leaching Chamber - 6' HDPE Riser, 8" Diameter in Gravel Wetland			
3E	Crushed Stone - Placed Below Drainage Structures			
<b>Item 4 - Piping</b>				
4A	Trench Excavation - Assume 100 LF, 4' Wide, Average 12 FT Deep			
4B	12" RCP Pipe - Inlet Pipe and Outlet Pipe			
4C	12" RCP Flared End - Placed at Inlet and Outlet Pipes			
4D	Gravel Borrow - Place 30" Layer in 100 LF Pipe Trench			
4E	Riprap - Place 12" Layer at Inlet Pipe and Overflow Spillway			
4F	6" Perforated Pipe Perimeter Drain - Install Around Gravel Wetland			
<b>Item 5 - Trench Paving</b>				
5A	Sawing Asphalt Pavement - Sawcut Existing Pavement			
5B	Hot Mix Asphalt - Repair Pipe Trench in Road			
5C	Rubberized Asphalt Sealer - Repair Pipe Trench through Road			
<b>Item 6 - Site Restoration</b>				
6A	Loam Borrow - Additional Loam Needed			
6B	Topsoil Rehandled and Spread - Spread New and Stacked Loam			
6C	Seeding - Basin Mix and Restoration Mix			
<b>Item 7 - Miscellaneous</b>				
7A	Police Detail			

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**ATTACHMENT B - ENGINEER'S CONCEPTUAL COST ESTIMATE, BARNSTABLE**

TOWN : Barnstable, MA

PROJECT: Subsurface Gravel Wetland

ITEM #	Item Description / Notes	QTY.	UNIT	UNIT \$ PRICE	TOTAL \$ VALUE
<b>Item 1 - Mobilization and Erosion Controls</b>					
1A	Mobilization, Demobilization and Travel				
1B	Erosion Controls - As Needed, Assume 100 LF				
<b>Item 2 - Excavation and Gravel Wetland Construction</b>					
2A	Strip Topsoil for Reuse - Assume 6" Deep, 65% Usable				
2B	Site Excavation - Regrade Site and Dig Gravel Wetland				
2C	Excavation Dewatering				
2D	Geotextile Fabric for Separation				
2E	Crushed Stone - Place 30" Layer at Bottom of Gravel Wetland				
2F	Wetland Soils - Place 8" Layer on Top of Gravel Wetland				
<b>Item 3 - Drainage Structures</b>					
3A	Outlet Control Structure - RCP, 4' Diameter				
3B	Manhole - RCP, 4' Diameter				
3C	Frame and Cover - Assume 1 per Above				
3D	Crushed Stone - Placed Below Drainage Structures				
3E	Trench Excavation - Assume 20 LF, 4' Wide, Average 4 FT Deep				
3F	Riprap - Place 12" Layer at Inlet Pipe				
<b>Item 4 - Piping</b>					
4A	Pipe Removal - Assume 40 LF of 24" Pipe Removal				
4B	24" RCP Pipe - Assume Used for Drainage Tie-In				
4C	24" RCP Flared End - Placed at Inlet Manhole				
<b>Item 5 - Site Restoration</b>					
5A	Loam Borrow - Additional Loam Needed				
5B	Topsoil Rehandled and Spread - Spread New and Stacked Loam				
5C	Seeding - Basin Mix and Restoration Mix				
<b>Item 6 - Miscellaneous</b>					
6A	Police Detail and Pedestrian Control				

**(b) (4)**